

Remarks

Applicant has filed this amendment in response to the Office Action dated July 30, 2003. Claims 24-25, 38 and 53 have been amended and claims 1-19, 27-31 and 57-59 have been canceled without prejudice. New claims 60-62 have been added. Claims 20-26, 32-56 and 60-62 are currently pending. Reexamination and reconsideration are respectfully requested.

Claims 1-19, 27-31 and 57-59 have been canceled without prejudice to further prosecute these claims at a later date. Claim 1-19 and 27-31 were previously canceled without prejudice.

Claim 38 was objected to for an informality. Applicant has amended claim 38 to delete the term "an" and insert "a" in its place as suggested by the Examiner.

Claims 20-25, 32-34, 38-39, 40-49 and 51-59 were rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent 6,087,243 to Wang ("Wang"). The rejection is respectfully traversed.

Regarding independent claim 24, the Examiner stated at page 3 of the Office Action that Wang describes "after the subjecting the dielectric layer to a thermal treatment at a temperature about 900C to 1100C, forming a well in the semiconductor substrate adjacent to the trench," citing Wang at col. 6, lines 56-60. Applicant respectfully submits that the Examiner's statement is not supported by his citation to the art. Wang, at col. 6, lines 53-57 are quoted below:

Silicon nitride layer 13 is then removed leaving a pad oxide layer of about 100 Å to about 300 Å, typically about 150 Å. Retrograde well implants are then formed, as by ion implantation. Heating is then conducted at a first temperature of about 900°C. to about 1100°C. for a first period of time . . . during which the oxide trench fill is densified . . .

As indicated in the quoted text above, "Retrograde well implants are formed Heating is then conducted . . ." Thus, it appears that Wang does not teach a method including "after the thermally treating the dielectric layer at a temperature of at least 1050°C, implanting impurities to form a well in the first layer adjacent to the trench" as recited in claim 24, as amended. Instead, the Examiner's citation to Wang appears to describe forming retrograde wells prior to the heating. Wang at col. 6, lines 53-61.

In addition, the Examiner's citations to Wang does not appear to describe or suggest "thermally treating the dielectric layer at a temperature of at least 1050°C after forming the sacrificial oxide layer" as recited in claim 24, as amended.

Accordingly, for either of the reasons above, applicant respectfully requests that the rejection of claim 24 be withdrawn. The rejection of dependent claims 20-23 and 25 should be withdrawn for at least the same reasons as claim 24.

With respect to independent claim 32, the Examiner stated on page 5 of the Office Action that Wang differs from the claimed invention as "not showing to form a well region between a first trench and a second trench of the plurality of trenches . . . wherein the well region is formed to extend continuously in the semiconductor layer from the first trench to the second trench." The Examiner also stated that "one having ordinary skill in the art would have been required to form the well region that extends continuously in the semiconductor layer from the first trench to the second trench. It is known in the art as shown for example by US Patent No. 6,028,339." Applicant does not agree with the Examiner's statement regarding what would be "required". The position of a well region may be controlled by the location of mask layers and one can vary the position as desired. Applicant is unaware of any "required" location for a well region. The Examiner himself stated that Wang does not describe the claimed well location, so applicant does not understand how such a location could be "required".

Moreover, applicant notes that the Examiner's citations to Wang do not describe or suggest a method including "after the thermally treating the dielectric layer in the trenches, forming a well region between a first trench and a second trench of the plurality of trenches . . ." as recited in claim 32. Instead, as described in Wang at col. 6, lines 55-57, Wang appears to describe forming well regions prior to the "thermally heating the dielectric layer in the trenches." Accordingly, for at least the above reasons, the rejection of claim 32 and its dependent claims 33-34 and 38-39 should be withdrawn.

Regarding independent claim 40, applicant respectfully submits that for similar reasons as discussed above for claim 32, the Examiner has cited no portion of Wang that describes or suggests a method including all of the elements recited in claim 40, including "forming a well in the semiconductor layer after the thermal treatment of the dielectric layer." Accordingly, for at least the above reason, the rejection of claim 40 and its dependent claims 41-49 and 51-56 should be withdrawn.

Independent claim 57 and its dependent claims 58-59 have been canceled for reasons unrelated to the rejection over Wang.

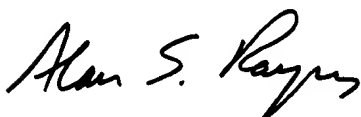
Claims 26, 35-37 and 50 were rejected under 35 U.S.C. 103(a) as unpatentable over Wang in view of U.S. Patent No. 6,165,854 to Wu ("Wu"). The rejection is respectfully traversed. The Examiner cited no portion of Wu that overcomes the deficiencies of Wu noted above for claim 24 (from which claim 26 depends), for claim 32 (from which claims 35-37 depend), and for claim 40 (from which claim 50 depends). Accordingly, for at least the same reasons as described above for claims 24, 32, and 40, applicant respectfully requests that the rejection of claims 26, 35-37 and 50 be withdrawn.

The Office Action also included various comments concerning the art and the non-patentability of features in various of the pending claims. Applicant notes that the Examiner's comments in the Office Action that have not been specifically discussed above are deemed moot at this time in view of this response.

New claims 60-62 have been added. Support for these claims may be found throughout the specification and figures. It is believed that no new matter has been entered. Examination of the new claims is respectfully requested.

Applicant respectfully submits that the pending claims are in patentable form. Reexamination and reconsideration are respectfully requested. If, for any reason, the application is not in condition for allowance, the Examiner is requested to telephone the undersigned to discuss the steps necessary to place the application into condition for allowance.

Respectfully submitted,



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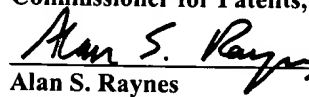
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 October 30, 2003
Alan S. Raynes (Date)